Bootsole

Air Quality Report

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for:

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Introduction

This report describes existing and desired conditions of the air quality within the Bootsole project area and the direct and indirect effects on air quality from implementing the Bootsole Project. It also documents that there would be no significant negative effects on air quality, and therefore, no extraordinary circumstances related to this resource, resulting from implementation of the Bootsole Project.

Air Quality is assessed with respect to whether pollutants generated by the project would exceed state and federally mandated air quality standards.

Summary of Effects

The Bootsole Project would have no significant negative effects to air quality due to the controls in place to manage the release of pollutants from prescribed burning and measures to control project-generated fugitive dust. Therefore, there would be no extraordinary circumstances related to air quality resulting from implementation of the Bootsole Project.

Prescribed burning would only occur on 'permissive' burn days as defined by the California Air Quality Board (CARB). CARB makes daily determinations of smoke transport conditions and grants permission to burn only on days with adequate smoke transport and dispersal conditions. Short-term production of smoke and associated emissions would occur during prescribed burning in the project area. However, daily coordination among local fire management officials, adherence to the project Smoke Management Plan (SMP), and the daily determination of smoke transport conditions by CARB would help to ensure that the smoke and related emissions for the proposed prescribed fire activities would stay within the standards of the Clean Air Act. The direct effects to air quality would be minimal and mitigated by following the guidance of the SMP and CARB. Fugitive dust would be mitigated by standard contract requirements for road watering or other dust abatement techniques

If the Bootsole Project were not implemented, the landscape would remain at risk of high severity wildfire that has the potential to release substantial concentrations of particulates and other pollutants into the atmosphere with little to no control over emissions. An analysis of the effect that the project's thinning treatments would have on future carbon storage if wildfire were to occur after thinning demonstrate that implementation of the Bootsole project would result in substantial greenhouse gas (GHG) benefits over the next 50 years compared to if a wildfire but no thinning treatments occurred. These benefits would accrue from sequestered on the landscape, long-term storage in wood products, and use of biomass removed from the project to generate electricity.

Affected Environment

Existing Condition

The Bootsole Project is located on top of the escarpment above the community of Janesville, CA; approximately 3 miles south of Janesville and 10 miles northwest of Milford. Other communities within a 20-mile radius that could experience smoke impacts from the project area include Buntingville, Litchfield, Johnstonville, and Susanville. The project area is in Plumas County and falls within the Northern Sierra Air Quality Management District. The District is required by state law to achieve and maintain the federal and state Ambient Air Quality Standards, which are

air quality standards set at levels that will protect the public health. State and Federal Air Quality Standards are shown in Appendix A.

Plumas County is in attainment or unclassified for all State and Federal ambient air quality standards except for particulate matter, PM 2.5 an PM 10, therefore emissions of these two pollutants are of primary concern for Bootsole Project. Particulate matter pollution consists of very small particles suspended in the air. Of greatest concern to public health are the particles small enough to be inhaled into the deepest parts of the lung. These particles are less 1/7th the thickness of a human hair and are divided into two size classes for air quality standards and monitoring; particles that are less than 10 microns in diameter, (PM10), and those that are less than 2.5 microns in diameter, (PM2.5). A portion of Plumas County in the Portola valley is in non-attainment for both Federal and State PM 10 standards. All of Plumas County is in non-attainment for PM 10 (see maps in Appendix A). The aforementioned population centers closest to the project area lie within Lassen County which is attainment (PM 2.5) or unclassified (PM 10) for both pollutants.

The primary sources of particulates in the area surrounding the Bootsole project are largely locally generated and include woodstoves, open burning, and dust from traffic and wind. In the summer and fall of 2020, wildfire was a major contributor to air pollution in throughout Plumas and Lassen Counties. During the winter months woodstove smoke and strong wintertime inversions have had a major impact on particulate monitoring stations in local communities. As more efficient and EPA compliant stoves replace older models, improvements in air quality have been noticeable. Smoke from local and more distant USFS prescribed fires likely contribute to periodic spikes in particulates.

Desired Condition

The desired condition is for the project to comply with the State and Federal Air Quality Standards are shown in Table 1 (Appendix A).

Environmental Consequences

Methodology

Air quality impacts from Bootsole prescribed burning treatments were analyzed using a suite of modeling approaches. The Fire and Fuels Extension (FFE) of the Forest Vegetation Simulator (FVS), a widely used forest growth and yield model developed by the USDA Forest Service, was used to calculate the PM 2.5 and PM 10 emissions associated with prescribed fire treatments; prescribed fire was simulated in the early spring under dry fuel moisture conditions. These emissions were compared with those from a wildfire simulated later in the season (late summer/fall) under 90th percentile weather conditions (as described in the Fire and Fuels Report, Project Record).

BlueSky Playground 3.0.1 (USDA 2022) was used to estimate the emissions, from prescribed fire and wildfire, of other state and federally-regulated pollutants. BlueSky is a modeling framework that links a variety of independent models of fire information, fuel loading, fire consumption, fire emissions, and smoke dispersion to calculate estimates of fuels consumed by fire, differentiated emissions (e.g., CO2, PM 2.5) from fire, and smoke trajectories and concentrations.

The greenhouse gas (GHG) benefits of the project were calculated using the California Air Resources Board (CARB) Quantification Methodology for the Department of Forestry and Fire

Protection (CAL FIRE) Forest Health Program (CARB 2019). Benefits were calculated for fuels reduction activities and subsequent use of biomass removed from the project. Benefits were calculated as follows:

FUELS REDUCTION

Net GHG benefit = change in standing live tree carbon stocks (above and belowground) in the treatment boundary as a result of reduced mortality from wildfire – carbon in biomass removed from treatment boundary – mobile combustion emissions from mechanical treatments

BIOMASS UTILIZATION

Net GHG Benefit = carbon stored long-term in wood products + avoided emissions from fossil fuel-based energy displaced by biomass energy – stationary combustion emissions from biomass energy production

Alternative 1 – Proposed Action

Direct and Indirect Effects

The direct effects of the prescribed fire treatments would be smoke produced from burning forest litter, duff, and downed woody debris and a release of particulate matter into the environment. Fugitive dust could result from logging operations such as skidding and hauling during dry seasons. It would be mitigated by standard contract requirements for road watering or other dust abatement techniques.

The indirect effects of prescribed fire treatments could be an increase in the number of smoke related nuisance phone calls from the public during underburning or pile burning operations. Within the project and surrounding area, there could be short term impacts to visibility along roads. In the event of a wildland fire, treatments would result in decreased smoke production and associated emissions. This decrease in emissions would help to reduce smoke related impacts to nearby communities.

Projected pollutant emissions from the Bootsole Project are shown in Table 1. Per acre (Figure 1), and therefore, total emissions for all pollutants would be approximately double (ranging from 1.7 to 2.2 times greater) under a wildfire scenario with no treatment as compared to project-related prescribed burning. (Table 1). Greenhouse gas emissions from prescribed burning would only be a small percentage of the normal background emissions occurring across the landscape, and therefore would not be a significant contribution to climate change (the net effect of the Bootsole Project on GHGs is discussed at the end of this section).

The emissions reported in Table 1 are totals for the entire project area, however, implementation of underburning and pile burning would occur over several years as weather conditions and resource availability permit, and therefore emissions would occur over several years. It is also important to note that not all units designated for fire use would ultimately receive burning treatments. All treated units would be evaluated after thinning to determine post treatment surface fuel loads. Units meeting desired conditions for fuel loads post thinning may not be burned, thereby decreasing total burned acres and associated emissions. In addition, prescribed burning units were generally created larger than what would actually burn in order to provide ample holding opportunities. During burning activities, smoke would likely be visible from nearby communities when the prevailing winds blow from the west.

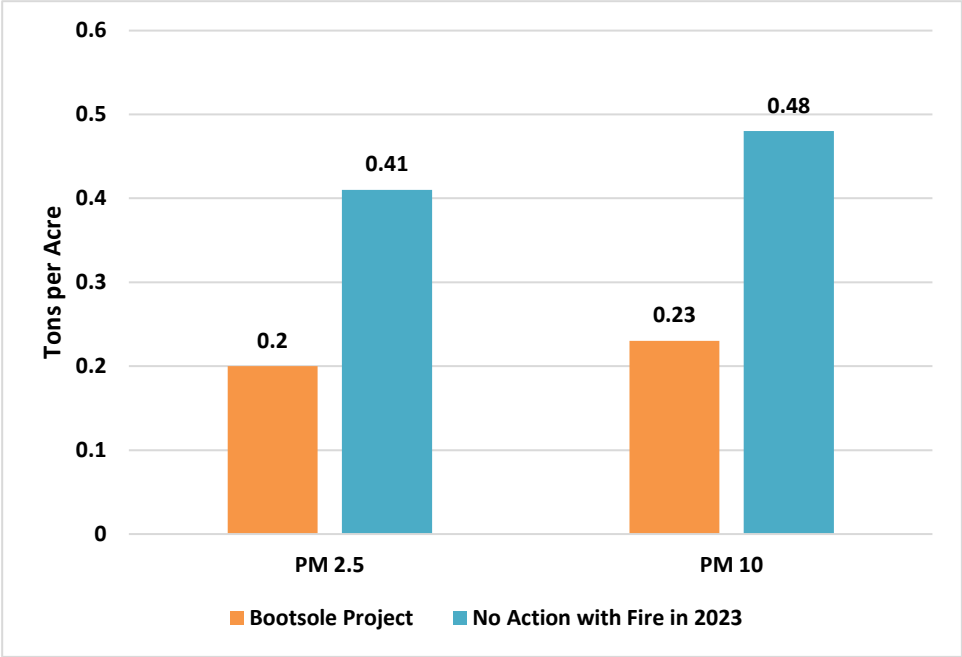

Figure 1: Emissions of PM 2.5 and PM 10 (tons/acre) calculated using Forest Vegetation Simulator (FVS) for: prescribed fire following Bootsole Project treatments: and wilfire burning the same area.

Table 1. Estimated emissions of pollutants released by burning wood for a prescribed fire and a wildfire burning in the 4,233-acre Bootsole project area.

Pollutant	Emissions (tons) for 4,233-acre project	
	Bootsole /Prescribed Fire	*No Action/ Wildfire*
PM 2.5	826.64	1,744.36
PM 10	971.76	2,029.08
CO	6,628.77	11,243.84
CO_2	79,589.96	141,613.86
GHGs	93,986.71	167,584.95
CH_4	310.72	589.09
NO_x	50.33	100.19
VOC	1,609.68	3,619.13
NH_3	77.17	143.77
SO_2	70.11	135.06

Estimates of emission in total tons of pollutants released give a relative measure of potential air quality impacts, however direct correlations to air quality standards are difficult because the most relevant measures for air quality are density of particulates in the atmosphere over a given time period of exposure time rather tons of pollutant emitted per acre. Therefore, implementation of prescribed burning relies on daily determinations of smoke dispersal and transport conditions.

In accordance with Title 17 of the California Code of Regulations, a smoke management plan would be submitted to and approved by the Northern Sierra Air Quality Management District

prior to any prescribed fire ignitions that are part of the proposed action. Adherence to the smoke management plan (SMP) for pile and understory burning would decrease the chance of negative impacts to communities and other smoke sensitive areas. It would also help to ensure that emissions from pile or understory burning would not violate the National Ambient Air Quality (NAAQ) emission standards

Prescribed burning would only occur on 'permissive' burn days as defined by the California Air Quality Board (CARB). CARB makes daily determinations of smoke transport conditions and grants permission to burn only on days with adequate smoke transport and dispersal conditions. Short-term production of smoke and associated emissions would occur during prescribed burning in the project area. However, daily coordination among local fire management officials, adherence to the SMP, and the daily determination of smoke transport conditions by CARB would help to ensure that the smoke and related emissions for the proposed prescribed fire activities would stay within the standards of the Clean Air Act. The direct effects to air quality would be minimal and mitigated by following the guidance of the SMP and CARB.

In addition to these safeguards, a daily Air Quality Conference Call is conducted during the prescribed fire season. They are attended by representatives of the Air Quality Management Districts, the California Air Resources Board, Geographical Area Coordination Center meteorologists and agencies that are conducting prescribed fire operations. These calls help ensure that burning only occurs when atmospheric conditions are conducive to smoke dispersion and that the cumulative effects of all prescribed burning remain at levels that are within the provisions of the Clean Air Act.

Due to the controls in place to manage the release of particulates and other pollutants, this project would have no significant effect to air quality.

The greenhouse gas benefits to the project from thinning are derived from the benefit that proposed treatments would confer to the project area if a wildfire were to burn. Total aboveground carbon storage at the end of 50 years (the shortest analysis period considered by the CARB GHG quantification methodology) is compared for treated and untreated stands in which a simulated fire enters the area halfway through a 25-year effective treatment period. Treatments implemented by the Bootsole Project were shown to be effective for this many years (see Fire and Fuels Report and Silviculture Report available in the Project Record). Additional benefits would be derived from the long-term storage of carbon removed as wood and the short-term benefit of using chips to generate electricity. Under the modeling scenarios specified, by CARB (2019), the Bootsole Project would result in substantial net GHG benefits (Table 2).

The GHG benefits shown in Table 2 would be greater if extended to an area of the project's influence outside of the project area as a wildfire would not likely be contained within the project footprint. Attainment of additional GHG benefits was one of the drivers behind designing the Bootsole Project to provide strategic protection from wildfire at the landscape scale. GHG benefits would be gained from all treatments except for those in the California Spotted Owl (CSO) Protected Activity Center (PAC). Thinning trees six inches in diameter and less would not prevent the occurrence of stand-replacing wildfire in the PAC, and therefore, if a wildfire burned at high intensity through the PAC there would be no remaining carbon stored in aboveground live biomass. This benefit would likely be greater as a wildfire would not likely be confined to the project area.

The GHG benefits were calculated assuming five hundred acres of aspen restoration treatments. If this number were increased to 1,000 acres, GHG benefits would be reduced by up to 87,034 MT CO2e over the 50-year growth projection.

Table 2. Greenhouse gas benefits from implementing fuels reduction and biomass utilization activities associated with the Bootsole Project. In Scenario 1, 686 acres of the project area would be treated with 40% canopy cover and basal area retention standards. In Scenario 2, these 686 acres would be treated with only 30% basal area retention standards.

	Scenario 1	Scenario 2
Net GHG Benefit (MT CO_2e)	**463,014**	**436,222**
GHG benefit from fuels reduction activities (MT CO2e)	**483,302**	**456,275**
GHG benefit from fuels reduction in eastside pine (MT CO_2e)	330,087	399,874
GHG benefit from fuels reduction in Sierran mixed conifer (MT CO_2e)	96,814	n/a
GHG benefit from fuels reduction in mechanical fuels (MT CO2e)	49,401	49,401
GHG benefit from aspen restoration	7,000	7,000
GHG benefit from fuels reduction in CSO PAC (MT CO2e)	0	0
GHG loss from MT CO2e released from prescribed burning (BlueSky)	**-79,590**	**-79,590**
GHG benefit from biomass utilization activities (MT CO_2e)	**59,302**	**59,537**
GHG benefit from utilizing biomass for electricity generation (MT CO2e)	3,209	2,930
GHG benefit of carbon stored long-term in wood products (MT CO2e)	56,093	56,607

Alternative 2 – No Action

Direct and Indirect Effects

Alternative 2 would create no short-term impacts from smoke to the local areas because prescribed fire would not be implemented in the project area. However, the risk of a major air quality impact from a large wildland fire burning in the area would be greater if the Bootsole project were not implemented. The amount of smoke created, in the event of a large wildland fire burning in the project area, would be greater than the smoke released by a prescribed fire in the same area for several reasons. There would be more acres burned in a shorter period of time, and the fire would burn under hotter and drier conditions. Therefore, the amount of fuel consumed would increase and fuels would burn that would otherwise have been removed by thinning and underburn treatments. Increased consumption of the canopy fuels, due to the more intense fire behavior, would also contribute to increased smoke production.

More smoke, and associated pollutants, would be produced. There would be no ability to choose conditions under which wildfire would burn and smoke would travel unlike prescribed burning which occurs only when conditions for atmospheric mixing and dispersal allow for minimal short-term effects to air quality. Additionally, smoke impacts to local communities would be more severe in the event of a wildland fire due to normal summer inversions. Inversions cause smoke to linger near the surface in low-lying areas and can last for extended periods, especially during summer conditions.

References

California Air Resources Board (CARB). 2020. Quantification Methodology for the Department of Forestry and Fire Protection (CAL FIRE) Forest Health Program. Available at: CCI Quantification, Benefits, and Reporting Materials | California Air Resources Board

United States Department of Agriculture (USDA). 2022. BlueSky Playground 3.0.1 Available at: BlueSky Playground (airfire.org)

Appendix A

Table A-1. State and Federal Air Quality Standards

Ambient Air Quality Standards						
Pollutant	**Averaging Time**	**California Standards [1]**		**National Standards [2]**		
		Concentration [3]	**Method [4]**	**Primary [3,5]**	**Secondary [3,6]**	**Method [7]**
Ozone (O_3)[8]	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.070 ppm (137 µg/m^3)		
Respirable Particulate Matter (PM10)[9]	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		—		
Fine Particulate Matter (PM2.5)[9]	24 Hour	—	—	35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	12.0 µg/m^3	15 µg/m^3	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	—	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	—	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	
Nitrogen Dioxide (NO_2)[10]	1 Hour	0.18 ppm (339 µg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 µg/m^3)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)		0.053 ppm (100 µg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[11]	1 Hour	0.25 ppm (655 µg/m^3)	Ultraviolet Fluorescence	75 ppb (196 µg/m^3)	—	Ultraviolet Flourescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 µg/m^3)	
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas)[11]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[11]	—	
Lead[12,13]	30 Day Average	1.5 µg/m^3	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m^3 (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 µg/m^3		
Visibility Reducing Particles[14]	8 Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	**No National Standards**		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

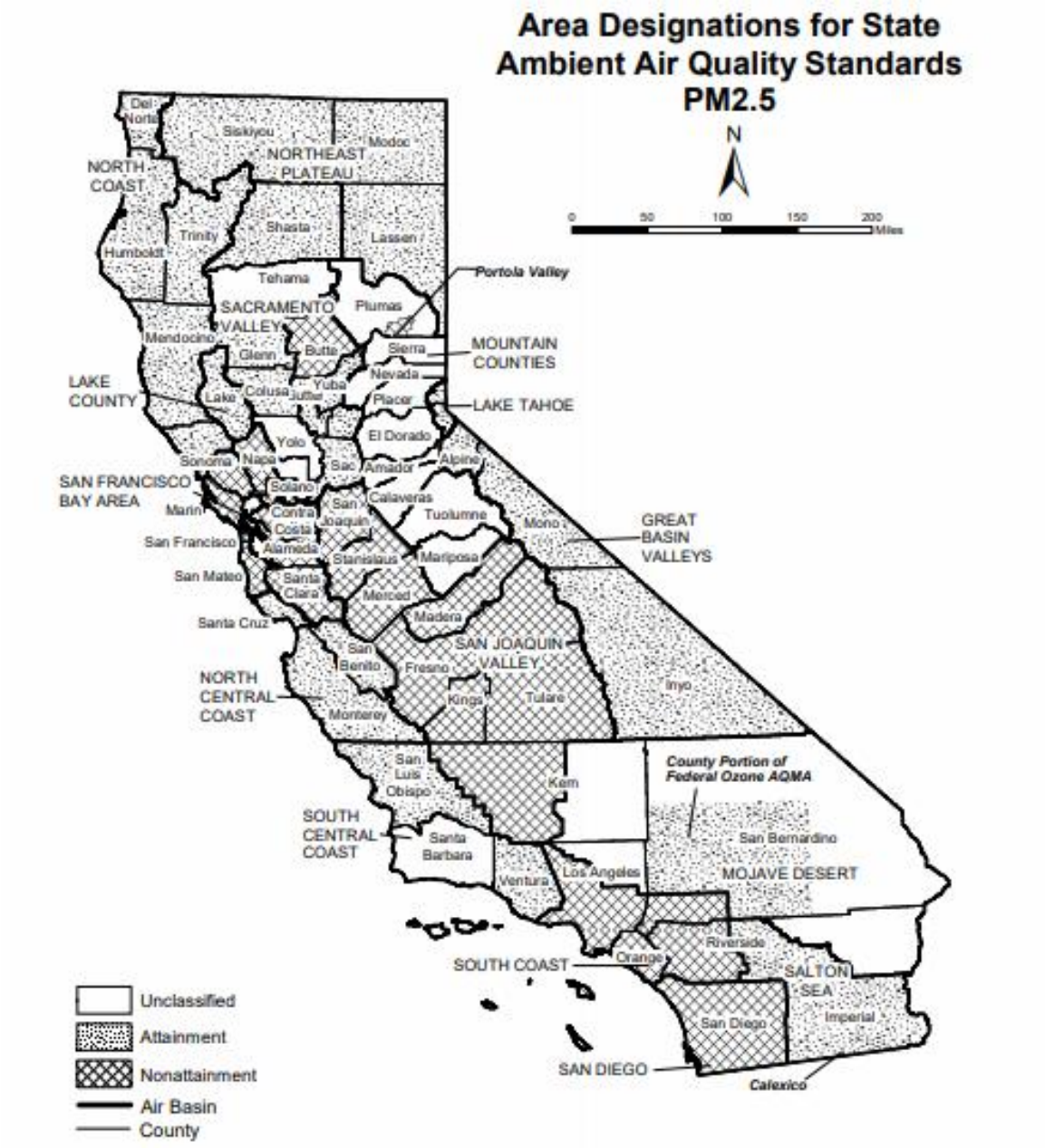

Figure A-2: Map of State of California PM 2.5 attainment status by county. The area of Plumas County in nonattainment at the state level is also in nonattainment at the federal level.

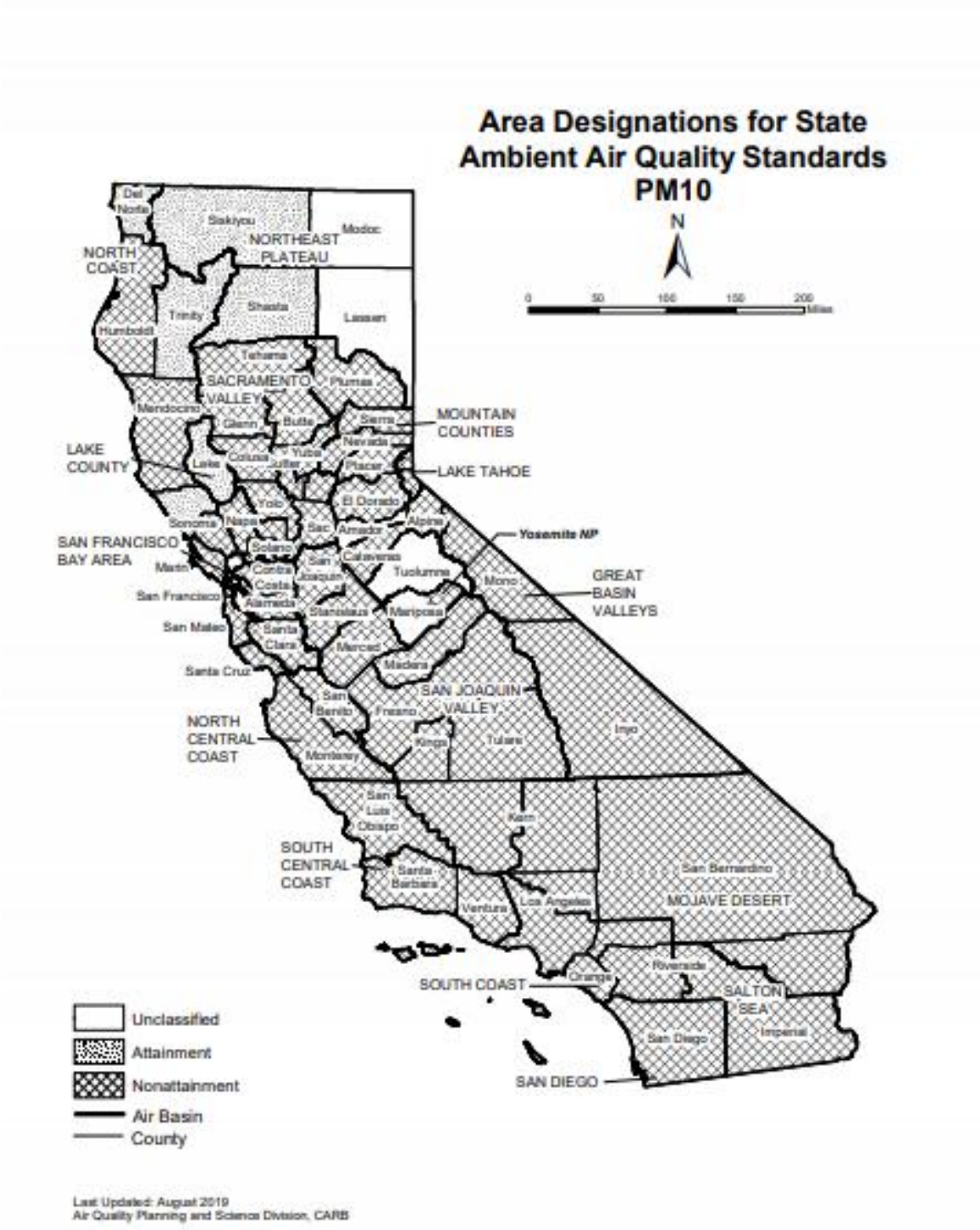

Figure A-3: Map of State of California PM 10 attainment status by county.